ASTRONOMY in Italy has suffered three heavy losses within a few months in the deaths of Riccò, Millosevich, and Celoria. GIOVANNI CELORIA, who died in Milan on August 18, was born in Piedmont in 1842, graduated at the University of Turin in 1863, and then studied astronomy at Bonn and Berlin. On returning to Italy he was appointed by Schiaparelli an assistant at the Brera Observatory, Milan, where he remained almost all his life, becoming director in 1900, on Schiaparelli's retirement, and himself retiring in 1917. Celoria's astronomical studies were devoted mainly to the structure of the star system; he repeated some of Sir W. Herschel's work on star-gauging, though with a much smaller telescope, and inferred the comparative thinness of the star-stratum in the direction of the north galactic pole from the fact that in this region he could see as many stars as Herschel had seen. He did useful work in another direction by collecting and discussing the records of several total solar eclipses the tracks of which crossed Europe in the Middle Ages, and he was able to fix the boundaries of totality with considerable precision; his work has been utilised by Dr. Cowell and others in the discussion of the secular acceleration of the moon. Celoria was also interested in geodesy, and held for a long time the chair of that subject in the Technical College of Milan. He was elected an associate of the Royal Astronomical Society in 1917.

WE regret to note that the death of MR. GEORGE TANGYE is announced in the *Engineer* for October 15. Mr. Tangye started business in Birmingham, with four other brothers, in 1858. The firm was a very modest undertaking at the start, but came rapidly into prominence on account of the successful launching of the *Great Eastern* steamship, which was accomplished by use of the Tangye hydraulic jack. The firm was one of the first to introduce steam-engines with interchangeable parts; its products in many fields of engineering have now a world-wide reputation. Mr. Tangye lived for many years at Heathfield Hall, formerly the home of James Watt. He carefully preserved Watt's garret workshop, and brought together a fine collection of relics of Boulton and Watt, which he finally gave to the city of Birmingham.

THE death is announced in *Engineering* for October 15 of SIR JOHN MCLAREN, who was well known in Leeds engineering circles. Sir John was born in 1850, and finished his education at Durham University. He started in business in 1876 with his brother, and his firm carried out many important contracts. When the war broke out he was made chairman of the board of management of the National Factories for Munitions in Leeds. He was a member of the Institution of Civil Engineers and of the Institution of Mechanical Engineers.

BY the death of MR. HENRY STEEL on October 7, chairman of the United Steel Companies, many organisations with which he was prominently connected have suffered a severe loss. Mr. Steel was educated in Brussels and at the University of London. The combine of which he was chairman included many large firms, and had a capital of more than 9,000,000*l*. He became a member of the Iron and Steel Institute in 1886.

Notes.

PROF. T. W. EDGEWORTH DAVID, C.M.G., F.R.S., professor of geology in the University of Sydney, has been appointed a Knight Commander of the Order of the British Empire (K.B.E.) for services in connection with the war.

THE gold medal of the Royal College of Physicians, which is awarded by the college every three years for distinction in public health, was presented to Dr. W. H. Hamer, Medical Officer of the County of London, on Monday, October 18.

THE Emil Fischer memorial lecture will be delivered by Dr. M. O. Forster at the ordinary scientific meeting of the Chemical Society on Thursday, October 28, at 8 p.m. By the courtesy of the Institution of Mechanical Engineers, the meeting will be held in the lecture theatre of that institution.

THE expedition sent by the Norwegian Government, in command of Capt. G. Hansen, to lay depôts for Capt. Roald Amundsen has returned safely, having accomplished its task. The *Times* announces that Capt. Hansen, after wintering in the Eskimo settlement at Thule, started northward in March this year, accompanied by several Eskimo who had previously served with Peary. The march was along the coast of Greenland by Smith Sound and Kane Basin. North of Franklin Island fast sea-ice several years old enabled the expedition to cross Kennedy Channel to Grinnell Land. With some difficulty, due to extremely rough pack, Cape Sheridan was rounded and the goal of the march reached at Cape Columbia, the most northerly point of Grant Land. There the last of a series of depôts was laid which will enable Amundsen, if his Polar drift brings him to the neighbourhood, to abandon his ship and travel southward by easy marches to the Danish settlements in Greenland.

THE first Pan-Pacific Scientific Conference met at Honolulu on August 2–20, when some noteworthy resolutions were carried (*Science*, September 24). Dealing with the promotion of scientific education, the conference recommended that the compensation for instruction and for research in science should be increased in order that young men may enter upon scientific careers without sacrificing all hopes of reasonable monetary returns; and, further, that men of exceptional attainments should be given rewards which may be comparable with those offered by commercial undertakings. A resolution was also passed advocating that efforts should be made to keep the public fully informed of the progress of science and of its bearings on the affairs of the world. Resolutions which concerned more nearly the institutes and universities of the Pacific countries dealt with the training of teachers and lecturers, with the provision of fellowships, and with the migration of research students to institutions providing the best facilities for their own class of work. The conference recommended that the exchange of teachers between institutes in different countries should be encouraged with the object of widening the outlook of these instructors. Fellowships to which adequate stipends were attached ought to be regarded as rewards for scientific work, and substantial prizes given as rewards for young investigators who achieve notable results. It was also agreed that a clearing-house of information relative to opportunities for scientific study and research in the Pacific area should be established.

SIR W. H. BRAGG delivered a public lecture at University College, London, on October 7, as a general introduction to the courses on the history of science to be delivered there. After referring to the origin of these courses, the lecturer said there must be something innate in mankind to prompt an interest in Nature and to foster a belief in cosmic order in spite of apparent chaos. Already in the earliest civilisations, in ancient Egypt and Babylonia, we see the beginnings of that close study of Nature which has continued with varying success throughout the ages. It is in the nature of things for old views to be superseded. There has, however, been more of evolution than of revolution in the history of scientific ideas. Each generation tries to correlate all the facts known to it, and it can do no more. Newton correlated all his facts; Einstein has to take into account facts unknown to Newton. There is no finality in science. A belief in finality would lead to stagnation. The history of science is interesting in many ways. It reveals the steps that have led up to our present orientation; it traces the evolution of the great scientific conceptions—like the atomic theory, for example; it shows the development of potent scientific instruments like the thermometer, etc.; it tells the story of the fruitful application of scientific discoveries—wireless telegraphy, for instance; it has the great human interest of showing how workers drawn from all sorts and conditions have co-operated in the building up of science; and it narrates many an inspiring epic of heroic struggle and perseverance, of triumph and tragedy, in the disinterested pursuit of noble ends. No wonder, then, that throughout the country there is awakening a new interest in the history of science. The subject offers a valuable educational opportunity. It merits the serious attention of teachers and journalists and all whose business it is to teach how things have come to be what they are; and it is well adapted to serve all those who seek to improve their education by non-vocational studies that will add to the interest and joy of life.

AMERICAN philologists have long been occupied in elucidating the complex of dialects spoken by the Indian tribes. The more important languages have been fully investigated, but there still remain some minor linguistic groups which are gradually coming under inquiry. The Tunica, Chitimacha, and Atakapa languages, spoken within historical times in territory now incorporated with the States of Mississippi, Louisiana, and Texas, form the subject of a monograph by Mr. J. R. Swanton, published as Bulletin 68 by the Bureau of American Ethnology. The first, the Tunica, is now spoken by only some half a dozen persons in a small reservation. For our knowledge of these languages, now practically extinct, we are indebted to Dr. A. S. Gatscher, whose collections were made in 1886, and further researches among the scanty survivors by Mr. Swanton have added little new information. This scholarly monograph gives a grammar and comparative vocabulary of these three closely allied forms of speech.

THE native tribes which occupied the vast region extending eastward from the Mississippi to the Atlantic are now understood to belong to at least seven linguistic stocks. Of these groups the Algonquian was the most numerous, followed by the Muskhogean, Iroquoin, Siouan, Timucuan, Uchean, and Tunican, all differing to such a degree that one would not have been intelligible to the other, and often within the same linguistic family the various tribes spoke different dialects. Thus such a diversity of languages and a great range of climatic conditions, mountains, prairies, swamps, and lakes produced a variety of customs influenced by natural conditions and environment. In perhaps no way are these variations more pronounced than in the forms of the dwellings of the various tribes. This subject is fully illustrated in the monograph (Bulletin 69) by Mr. D. I. Bushnell, jun., issued by the Bureau of American Ethnology. In this we have an investigation of ancient village sites occupied by the various tribes, and the nature of the buildings erected by peoples in various stages of culture, which is full of interest.

IN the September issue of the *Entomologist's Monthly Magazine,* Mr. F. W. Edwards deals with the habit of certain midges (Ceratopoginæ) of sucking the juices of other insects. This propensity has long been known, but Mr. Edwards's exact observations appear to be the first connected series conducted in this country. The blood-sucking habit among the females of this group of insects possibly first arose from the partiality of its members for attacking other insects. Few people who have used their gardens towards dusk have escaped the irritating punctures caused by these minute flies.

IN the Transactions of the Entomological Society of London (July, 1920) is a paper by Dr. G. D. Hale Carpenter on the forms and Acræine models of the Nymphaline butterfly, *Pseudacraea eurytus Hobleyi,* on the islands of Lake Victoria. Contained therein are some observations bearing upon the explanation of the theory of mimicry by natural selection. The object of the author is to show that in the presence of greater numbers of models the mimics are found to be true to type, but that when they outnumber the models many transitional and other varieties are preserved. The paper is a confirmation and extension of the author's earlier article published in March, 1914. The destruction of butterflies, so far as selective action is concerned, is held to be mainly the work of young birds which have to learn what to eat and what to avoid. Thus in 1914, when the models were extremely abundant, any member of a combination would have been more likely to be the distasteful Acræine. The young birds would therefore leave that combination alone, while varieties of the Pseudacræa not conforming to the model would be destroyed. As the birds grew older, and in localities where the models had become scarcer, one must suppose that the birds had forgotten what the latter tasted like, so that no one form of Pseudacræa had much more chance of surviving than any other. This explanation presupposes that the bird fauna stays on an individual island and does not fly from one to another. Dr. Carpenter has already brought forward some evidence which suggests that this is actually what does occur.

MESSRS. A. S. KENNARD AND B. B. WOODWARD have published in the Proceedings of the Malacological Society for September some "Nomenclatorial Notes relating to British Non-marine Mollusca." After discussing the names of various species of Testacella and Helix, they point out that the genotype of Ancylus is *Patella lacustris*, Linn., and that *Ancylus fluviatilis*, which belongs to a different genus, must be called Ancylastrum. This is a most unfortunate conclusion, because it is the latter species that has given the name to the well-known Ancylus Lake and Ancylus Clay of the late Glacial period in North-West Europe. Scarcely less regrettable is the authors' desire "to once again point out" that the name Bulinus is not available for "the Egyptian shells [*sic*] which play the part of host to Bilharzia," or, indeed, for any mollusc. They may be right, but we do not agree that because O. F. Müller adopted Adanson's pre-Linnean name Bulinus for four species, one of which was that imperfectly described by Adanson, his action "of course involves the acceptance of [Adanson's] shell as the type of the genus." The authors are so severe on Dr. Annandale for thinking that the name Bulinus (or Bullinus) ought to be preserved because of its wide currency, that one is astonished to find them, almost with the same penful, writing of Bilharzia, which they must know to be a synonym of Schistosoma. It is doubtless their misfortune rather than their fault that pages which blame the eccentric Fitzinger for neglect in proof-reading should themselves exemplify that form of carelessness.

FROM Buenos Aires we have recently received a copy of *El Hornero*, a journal of Argentine ornithology published by a recently established society, La Sociedad ornitológica del Plata, constituted for the encouragement of the study of the birds of the southern portion of South America. The journal derives its name *Hornero* from the Spanish word denoting one of the most characteristic birds of Argentina, known to Englishmen as the oven-bird and to science as *Furnarius rufus*, and an illustration of the birds and their curious massive nest built up of clay adorns the cover of each issue. The present number contains a carefully prepared list of the different species of penguins found along the coasts of Argentina drawn up by Senor R. Dabbene, the editor of the journal, and a list of 254 species of birds found in the neighbouring Republic of Uruguay from the pen of Señor J. Tremoleras, of Montevideo. Mr. A. G. Bennett, of Port Stanley, in the Falkland Islands, contributes some notes on the habits and distribution of the marine birds of that distant outpost of the British Empire, illustrated by reproductions of photographs taken by himself. The parasitic Mallophaga of the Argentine are treated of at considerable length by Dr. F. Lahille, who has himself described 31 out of the 159 species known to exist in the Argentine; and, finally, Prof. Lucas Kraglievich has an article on the fossil birds of the Republic, in which he discusses the relationship of Phororhacus with the recently described Diatryma of the Eocene beds of the United States. There are a number of shorter articles and notes, with an ample bibliography of recent publications dealing with South American ornithology, and the general get-up and editing of the journal reflect great credit on the Sociedad ornitológica del Plata and the editor, Señor Dabbene.

MR. W. H. TALIAFERRO records (*Journ. Exper. Zool.*, vol. xxxi., No. 1, July, 1920) the results of observations on the reactions to light in *Planaria maculata*, planned with the object of ascertaining how far, in this Turbellarian, the function of the eyes in the reactions to light can be correlated with the histology of these organs. Hesse (1897), who worked with certain Triclads which were negative to light, and hence moved away from the source of stimulation, maintained that this reaction was due to the fact that the sensory cells or rhabdomes were shaded by the pigment-cup which partially enclosed them, whereas when the worm turned in any other direction the pigment-cup did not shade all the rhabdomes. When certain of the rhabdomes were illuminated, as in the latter case, the animal turned so as to bring the sensory region of the eye again into the shadow of the pigment-cup. Hesse therefore maintained that the localisation of the photic stimulus is the specific function of the pigment-cup, which enables the animal to direct its course away from the source of light. Mr. Taliaferro has carried out experiments on normal Planaria and on others from which one of the eyes, or a portion thereof, has been very carefully removed. He shows that the rhabdomes in the eye are arranged in two localised sensory regions. Illumination of one set is followed by the animal's turning towards the side containing the eye, while illumination of the remaining rhabdomes is followed by the animal's turning in the opposite direction. The observed reactions can be explained without assuming (with Hesse) that the pigment-cup acts as a localiser of photic stimuli. Light must strike a given rhabdome parallel to the long axis of the latter in order to cause stimulation; thus the position of the long axis of the rhabdome results in a localisation of photic stimulation. Light entering the pigment-cup from any given direction illuminates the rhabdomes in a definite area, and a large proportion of these have their long axes directed parallel to the stimulating rays of light.

WE have received from Prof. H. F. Osborn reprints of some interesting brief notes on vertebrate fossils in the American Museum of Natural History, New York. A good drawing is published of a newly mounted skeleton of Moropus, the strange odd-toed hoofed mammal from the Miocene of Nebraska, in which the large hoofs are sharply pointed and deeply cleft as in some edentates (Proc. Nat. Acad. Sci., vol. v., pp. 250–52, 1919). Prof. Osborn concludes that this must have been a forest animal, and that the peculiar feet were used, not for digging, "but largely for the pulling down of the branches of trees." A drawing of a restored and mounted skeleton of a long-jawed mastodon (Megabelodon) from the Pliocene of Texas shows well the comparatively short limbs of the earlier elephant-like mammals (Proc. Nat. Acad. Sci., vol. v., pp. 265–66, 1919). Beginning apparently in northern Africa, these long-jawed mastodons reached Europe in Lower Miocene times, and appeared in America (Texas) in the Upper Miocene, attaining a gigantic size in the Middle Pliocene. The monograph of the Titanotheres is progressing, and Prof. Osborn describes some new fragments of jaws from the Eocene of Colorado (Bull. Amer. Mus. Nat. Hist., vol. xli., art. xv., 1919). The Jurassic Dinosaurs are also being actively studied, and some valuable notes on the original specimen of the gigantic sauropod, Camarasaurus, from Colorado, are published by Prof. Osborn and Mr. C. C. Mook (Proc. Amer. Philos. Soc., vol. lviii., pp. 386–96, 1919). The authors agree with Dr. W. J. Holland that the axis of the skull in the sauropods inclines downwards from the vertebral axis as an adaptation for browsing, and they give some striking restored sketches of the head of Camarasaurus as they think it appeared in life.

THE Memoirs of the Geological Survey of India (vol. xlvii., part 1) contain an extremely interesting account of the mines and mineral resources of Yunnan by Mr. J. Coggin Brown. Yunnan is the most southwesterly of the provinces of China, and is of importance from the British point of view because it forms the eastern boundary of Burma and Assam; it has been but little visited by Europeans, and Mr. Coggin Brown's explorations thus afford authentic information upon an extensive area which has hitherto been most imperfectly studied. The more important mineral products which he has described comprise coal, iron, copper, lead, silver, zinc, tin, arsenic, gold and salt. In addition to Tertiary lignite, coal of Mesozoic, Triassic and Carboniferous age is known, and the author is of the opinion that the province contains considerable quantities of coal, some of which, at any rate, is of good quality. He does not think there is much probability that coal can be exported in competition with other coalfields of the Far East, but holds that it will find its chief demand in supplying the local railways and local domestic and metallurgical requirements. Iron ores occur in many places, and the production of cast-iron, castings, wrought iron and steel is sufficient for all local requirements, which are, of course, by no means extensive. The native methods of iron-smelting are well described, and it is interesting to find that the Chinese have developed charcoal blast-furnaces 25 ft. in height and 7 ft. across the boshes. The author does not think that there is much room in Yunnan for the development of iron-smelting upon modern European lines, but that the native smelters will gradually learn to improve their own methods. It is stated that copper has been smelted in Yunnan for at least a thousand years, but although copper ores are widely distributed the industry appears to be a declining one. The same seems to be true of lead and silver, but the production of tin, on the other hand, is in a flourishing condition.

SOME interesting facts showing the limits of the continental United States which have been compiled by the United States Geological Survey are published in *Science* of September 24. The gross area of the United States is 3,026,789 square miles, of which 2,973,774 square miles are land and the remainder, 53,015 square miles, water; this is exclusive of the area occupied by the Great Lakes and that within the three-mile limit on the Atlantic and Pacific seaboards and in the Gulf of Mexico. The most southerly point of the mainland is Cape Sable, Florida, which is in latitude 25° 7′ N. and longitude 81° 5′ W.; this point is really forty-nine miles further south than the southernmost point of Texas, which often appears in maps to be the most southerly part of the land territory of the United States. The most easterly point is West Quoddy Head, near Eastport, Maine, in longitude 66° 57′ W. and latitude 44° 49′ N.; and the most westerly Cape Alva, Washington State, in longitude 124° 45′ W. and latitude 48° 10′ N. A small detached land area of northern Minnesota provides the most northerly point, in longitude 95° 9′ W. and latitude 49° 23′ N. The distance from the most southerly point of Texas due north to the forty-ninth parallel, the boundary line between the United States and Canada, is 1598 miles. From West Quoddy Head due west to the Pacific Ocean is 2807 miles, while the shortest distance from the Atlantic to the Pacific across the United States is 1152 miles, measured from the neighbourhood of Charlestown, South Carolina, to San Diego, California. The Canadian boundary line from the Atlantic to the Pacific is 3898 miles in length; the Mexican, from the Gulf of Mexico to the Pacific, 1744 miles. The Atlantic coast-line measures 5560 miles, the Pacific 2730 miles, while that washed by the Gulf of Mexico is 3640 miles in length.

BLUE HILL Meteorological Observatory has issued its observations and investigations for the year 1919 as vol. lxxxiii., part 4, of the Annals of the Astronomical Observatory of Harvard College, U.S.A. The work has been done under the direction of Prof.

Alexander McAdie. Consecutive observations have now been published for thirty-four years. Atmospheric pressure, air temperature, vapour pressure, relative humidity, cloudiness, wind direction and velocity, and precipitation are given twice daily, at 8 a.m. and 8 p.m., throughout the twelve months, and the means and totals are entered for each month with the differences from the normals for the thirty-four years, 1886 to 1919. Wind frequency is given for each month and for the year for each 45° of the compass, and the mean and highest wind velocity. The duration of sunshine and the percentage of the possible amount are also included. Phenomena showing the advance of the season for each of the thirty-four years are given, such as thawing of ponds, last snowfall and last frost in spring, first blossom and first ripe fruit, first snowfall in autumn, and ponds frozen. There are numerous constants and averages for the thirty-four years, such as days with snow, hail, thunderstorms, and fog. Rainfall and snowfall and mean temperatures for each month of the thirty-four years are entered in tables. In the introduction a slip has been made in transposing the references to tables ix. to xi. A detailed description is given by Prof. McAdie of "a quick method of measuring cloud heights and velocities," which will doubtless be useful at aerographic stations.

BATAVIA Observatory has issued a volume of 140 pages, giving in detail the meteorological and magnetical observations for 1915, and also the meteorological results for the several months for the fifty years 1866 to 1915 and the means for the whole period. The work is published by the Government of East India, under the supervision of Dr. W. van Bemmelen, the director. For half a century hourly observations of many of the elements have been uninterrupted. A change has been made in the position of the barometer during 1915 which reduces the daily range of temperature of the attached thermometer from 5° C. to only a few tenths of a degree—an important factor when searching for the diurnal range of atmospheric pressure. For wind velocity the factor 3 has been used as formerly for the reductions, but it is found that the true factor decreases with the increasing velocities of wind. The results for fifty years probably give in many cases means which will vary little by any increase in the length of the period, but the fifty years may contain cycles the means for which may differ considerably among themselves. Rainfall results are given for fifty-two years, and breaking these into two periods of twenty-six years, the monthly averages are very different. Roughly speaking, the rainfall for the latter twenty-six years, 1890–1915, has increased in the southern winter months and decreased in the southern summer months. Magnetical observations are given only for 1915; there are curves showing the monthly deviations of the magnetic components from the mean yearly values.

THE Report of the Committee on the Standardisation of the Elements of Optical Instruments just issued by the Research Department contains much information of prime importance to instrument-makers. It fixes standard focal lengths and diameters for telescope objectives, angles of prisms for binoculars, and diameters of tubing and of screws and pitches of the latter. It strongly advocates interchangeability amongst the products of the different manufacturers, and points out that two years ago the screws nominally of the same size turned out by one optical firm only in the country were interchangeable amongst each other. That firm has in a most public-spirited way offered to supply the chasers and gauges necessary to secure interchangeability. The adoption by the Committee of the inch as the unit of length will not permit of the principle of interchangeability being extended to instruments of Continental manufacture.

IN the September issue of the Journal of the Franklin Institute Dr. F. E. Pernot has written an interesting and important paper on submarine-cable signalling. Dr. Pernot gives the results of experiments carried out by the members of the Signal Corps Research Laboratory of the U.S. Bureau of Standards. Several successful attempts were made to increase the carrying capacity of a submarine cable by superposing an alternating current on the existing system of direct-current signals. It is pointed out that currents of several frequencies can be used simultaneously, as each message can be separated by a suitable tuning device. The author is to be congratulated on having determined the physical constants of a submarine cable at various frequencies, both by calculation and by experiment. It is shown that the design of suitable apparatus becomes a straightforward problem. Actual trials of these methods with cables as long as 700 km. were made, the results being in all cases completely satisfactory. With longer cables difficulties were experienced, but the experiments indicated that it was possible to superpose at least one alternating current on the existing duplex system of an Atlantic cable. From the theoretical point of view it is interesting to note that the high-frequency resistance of a submarine cable is greater than that computed by Kelvin's formula. The effects of the steel armouring and the uncertainty in the position of the return currents would probably account for this. It was found that 5 microvolts at the receiving end gave good signals with the powerful amplifiers which are now available.

"THE Gases Dissolved in Water" formed the subject of the Streatfeild memorial lecture delivered by Mr. J. H. Coste at the Finsbury Technical College on October 14. In a brief historical sketch reference was made to the work of Henry, Dalton, and Bunsen on the estimation of gases dissolved in water, and to that of Dittmar in connection with the *Challenger* Expedition. Curves were shown to illustrate the results of Adeney's work on the rate of aeration of air-free water, and reference was made to the investigations of Tornøe, Winkler, Roscoe, and Dittmar on the variation with temperature of the volumes of gases dissolved in water, results being given for distilled water and sea-water. The absorption coefficients determined by Bohr and Bock were given, and a curve depicting the manner in which solubility of oxygen in water falls with rise of temperature was shown. A method of collecting samples from any depth was illustrated, and Winkler's method for estimating the volume of dissolved air in water explained. The lecturer referred to the utility of this work in such diverse fields as public health and oceanography, and indicated the importance of dissolved air to subaqueous plant and animal life. The function of submerged green plants in absorbing carbon dioxide and liberating oxygen was explained, and it was stated that large quantities of oxygen in excess of saturation were found after a period of plant activity in bright light. One function of this dissolved oxygen is to maintain a healthy condition in water by oxidising submerged refuse—a process largely dependent upon the presence of living organisms. Reference was also made to geological changes due to dissolved carbon dioxide, to hardness produced by the same gas, and to the corrosive action of water containing dissolved air as exemplified by the oxidation of ironwork in hot-water radiators, and by the corrosion observed in all steam-raising systems owing to the oxygen dissolved in the feed-water. At the close of his lecture Mr. Coste referred in eloquent terms to the work done at Finsbury College during the past thirty-five years, and deplored the fact that the closing of the college was contemplated.

Engineering for October 8 gives some interesting particulars regarding fabricated ships constructed in the United States. It will be remembered that these ships were so arranged as to permit the separate parts to be manufactured by a large number of firms and then assembled at the shipyard. The fabricated freighter has now been afloat long enough to experience sufficiently varied conditions to reveal its seaworthiness. It is a known fact that steamers of this kind have been able to forge ahead in the teeth of storms that have driven larger boats of the usual build to leeward. Replacements in cases of breakdown or injury have been made very promptly. Two steamers, one of which was a fabricated vessel, collided, and each smashed a hawse-pipe; the fabricated vessel was repaired from stock in a few hours, whilst repairs to the other ship took six weeks. Reports made by masters and chief engineers reveal the soundness of the hulls and their unusual tightness and freedom from leakages in the cargo-bilges, etc. Up to April 1 of the current year 120 fabricated craft had been launched from the twenty-eight ways of the Newark Bay shipyard, the keel of the first having been laid in December, 1917—a feat which constitutes a record. It is proposed to carry on this yard, and the Submarine Boat Corporation has taken it over from the Government. The programme provides for extensive developments of both the yard and its neighbourhood, with the idea of making that point a highly equipped port of entry and departure, with dry docks and other repair conveniences.

We learn that the X-ray and electro-medical business of the High Tension Co. has been purchased by X Rays, Ltd. Arrangements have also been made whereby Mr. Mortimer A. Codd, the author of a well-known book on the subject of high-tension apparatus, becomes the director of research for X Rays, Ltd. The direct association of an X-ray research laboratory with a manufacturing firm has yielded such astonishing results in America that one may look with confidence to the similar plan which has been initiated in this country.

We are informed that the head offices of Siemens Brothers and Co., Ltd., and of Siemens Brothers Dynamo Works, Ltd., will be removed shortly from Palace Place Mansions, Kensington, London, W.8, to Caxton House, Westminster, London, S.W.1.

Our Astronomical Column.

The Nova in Cygnus.—This object has continued to decline in brilliancy at a fairly steady rate. Mr. Denning writes that since the end of August the star has lost light at a rate equivalent to one-tenth of a magnitude daily. The nova has exhibited features differing in several respects from those of the bright novæ of 1901 (Perseid) and 1918 (Aquilid), which showed remarkable fluctuations in their declining stages and presented phenomena analogous to those of ordinary variable stars. It seems, in fact, as though the new stars of 1901 and 1918, after their great outburst and quick decline, were subject to a series of minor outbursts affecting them at short and fairly regular intervals.

No such disturbances have apparently been observed in the case of Nova Cygni. At Bristol, during the fifty-five nights from August 20 to October 13 inclusive, the star was observable on forty-seven nights, and it has now become a rather faint telescopic object, its magnitude on October 7 being only 8¼.

It is remarkable that since 1848 twelve new stars have been discovered which were visible to the naked eye, although during the preceding 150 years not one nova was recorded.

Connection of Planetary Nebulæ with Helium Stars.—*Astr. Nach.*, No. 5065, has an article by Herr H. Ludendorff on this subject. Herr Ludendorff alludes to the puzzling fact that the planetary nebulæ show a high average velocity in the line of sight, while the helium and Wolf-Rayet stars, with which they have spectroscopic affinity, have a conspicuously low one. It was at first thought that the number of nebulæ on Keeler's list, which was twelve, might be insufficient to deduce a trustworthy mean. But the publication of a much larger list of ninety-six nebulæ by Campbell and Moore has increased the mean radial velocity from 25 to 30 km./sec. It becomes very difficult to make any plausible scheme of cosmogony into which these nebulæ will fit. The low radial velocity of the helium stars is generally explained by their large mass on the assumption that the law of equipartition of energy applies to stellar velocities. There is, however, evidence of considerable mass in the case of the planetary nebulæ also. Campbell noted spectroscopic evidence of rotation in several cases. Combining these with van Maanen's parallaxes, Herr Ludendorff finds values for the masses of four planetaries as 14, 19, 162, and 28, that of the sun being unity. In view of this difficulty, he re-examines the evidence that spectroscopic binary systems give of the masses of the B stars, and states that it appears that those with the largest mass have also the largest radial velocity, and that the same rule appears to hold for the Wolf-Rayet stars.

While this result may help to bridge the gulf between the planetaries and kindred types of stars, it only removes one difficulty to create another. It remains to give a reasonable explanation of the increase of velocity with mass, which is quite opposed to preconceived ideas.